

TECHNICAL REQUIREMENTS FOR  
COMMISSIONED PROGRAMMES  
SUPPLIED TO S4C

AVAILABLE IN THE WELSH LANGUAGE

ISSUE B 2006

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## INTRODUCTION

The Broadcasting Act 1990 requires that signals carrying S4C shall attain high standards in terms of technical quality. Also, the 1996 Broadcasting Act, which is the statutory basis of digital broadcasting in the UK, requires that signals carrying the multiplex service attain high standards in terms of technical quality.

Furthermore, S4C does not wish its output to compare unfavourably with the transmissions of any other UK broadcaster.

The purpose of this document is to provide the principal operational and technical specifications to those producing commissioned programmes for transmission by S4C so that they meet S4C's requirements and to ensure compliance with the Broadcasting Acts 1990 and 1996, in terms of technical quality.

Equipment used for making programmes shall be capable of meeting performance figures as laid out by OFCOM. Details of which can be found at <http://www.ofcom.org.uk/tv/ifi/tech/>

Programme makers should find the technical requirements of S4C no more or less onerous than the requirements of other UK broadcasters.

Programmes of excellent technical quality have an inherent element of 'future proofing' relative to those of a lower standard, and programme suppliers should bear this in mind.

## DELIVERABLES FOR RECORDED PROGRAMMES

- : Master Tape in Digital Betacam format. All tapes delivered for transmission must be accompanied by documentation as defined below.
  
- : Unless otherwise agreed  
Until May 2007 2 x VHS copies with Hi Fi sound or 2 x DVD (-R) of master tape one with burnt-in timecode which must match that on the master tape, and one without. These will be used by the commissioning department to review the programme, and by the marketing department to select promotions and trailers. After May 2007 we will only accept DVD's.
  
- : If the programme is to be subtitled with closed captions that are not already encoded on line 335, one S-VHS and script as per section on subtitles.
  
- : Safety copy of master tape to be retained by the Production Company. R.O.T. of live programmes (or those played out "as live") to be delivered to S4C.

## DOCUMENTATION

A recording report must accompany each recording and give the following details:

1. Name of Production Company and facility providing master tape.
2. The programme title and episode/subsidiary title and production number.
3. Video and colour standard used.
4. Mono/Stereo, audio track usage, Dolby surround sound.
5. Picture Format: 4:3 Full Screen  
16:9 Full Height Anamorphic (shot and protected for 14:9)
6. Duration and timecode value for the start of each part.
7. Verification if subtitles present on line 335 or as open captions.
8. Confirmation that the tape has been approved by the supplier for transmission.

The cassette shell itself must be marked with items 2 & 5.

### **N.B.**

- : Liquidated damages may be imposed on the production company if deliverables are not complete or are not supplied at the agreed time or do not

conform to the requirements as specified in this document. The commissioning agreement will specify the nature and scale of such liquidated damages.

## QUALITY ASSESSMENT

Supplied programmes shall be capable of meeting the grading requirements as given by OFCOM using the CCIR 5-point grading scale, namely:

Live programmes using systems that meet the performance figures laid out by OFCOM should achieve a sound and vision grade of 5. Recorded programmes based on electronic production should achieve a grade of at least 4. The minimum quality that is normally acceptable is grade 3. S4C reserves the right not to broadcast programmes which in its opinion are technically unacceptable. The CCIR 5-point grading is:

<u>Quality</u>	<u>Impairment</u>
5 - Excellent.	5 - Imperceptible.
4 - Good.	4 - Perceptible but not annoying.
3 - Fair.	3 - Slightly annoying.
2 - Poor.	2 - Annoying.
1 - Bad.	1- Very annoying.

Picture monitors on which video parameters are assessed and gradings made should be grade 1 (reference EBU Tech 3263-E) and lined up to professional standards. A PLUGE (Picture Line Up Generating Equipment) signal shall be used prior to the assessment to ensure proper adjustment of brightness, contrast and grey scale.

## DELIVERY FORMAT AND VIDEOTAPE

Master Tape is to be Digital Betacam format.

Tape is to be free from oxide shedding, creases or other physical defects.

S4C reserves the right to reject any tapes that do not meet it's technical standards with respect to Error Rates etc.

Tapes should be protected by suitable packaging material for carriage.

Cassette shells will be suitable for automatic handling.

Care must be taken to avoid excessive changes in temperature or humidity during shipping. For example, avoid leaving tapes in a car overnight, in its boot on a winter journey, or in direct sunlight in summer. Either can cause damage and/or stiction when loaded in a playback machine.

## VIDEO SIGNAL

It shall conform to the 'Specification of Television Standards for 625-Line System 1 Transmissions in the United Kingdom' published by Ofcom. Details of which can be found at [http://www.ofcom.org.uk/tv/ifi/tech/tech\\_perf\\_code/tv\\_signal](http://www.ofcom.org.uk/tv/ifi/tech/tech_perf_code/tv_signal)

## VIDEO CONTENT

The picture shall be sharp and free of excessive black crushing, highlight compression and noise. Transient response should be such that ringing, smear and echoes are not noticeable. Colour rendition, especially skin tones, shall be natural. Any departure for artistic effect should be understandable to the viewer.

### **Use of Film:**

S4C welcomes programmes made on film or videotape, however great care and considerable expertise needs to be exercised at each and every step of the production chain. The choice of film speed, lighting conditions, use of negative stock, type of telecine transfer etc., can have a profound effect on final image quality.

### **Use of Low Contrast Stock:**

The television system is capable of handling a wide contrast range. However, ambient light in living rooms will crush out detail in the dark areas of the picture: Thus a theatre contrast print may not produce well on television, even though it is perfectly acceptable in a darkened cinema. Low contrast stock was introduced to overcome this problem and is very successful when used with high contrast negatives. However, it is not necessarily wise to use it for all television prints.

For example, when the original negative is relatively lacking in contrast, having been shot in natural light with overcast skies, the use of low contrast printstock may result in a flat and de saturated appearance. In a practical world, some shots will have more contrast than others will, and the choice of printstock has to be judged on extremes rather than the norm. Lighting will significantly affect the look so the printstock decision is best made before the shoot. A test may be worthwhile at this stage.

In summary, the majority of cases will benefit from low contrast stock, but a careful decision needs to be taken dependent on the contrast of the negative and the look desired.

### **35mm FILM DELIVERY**

S4C, from time to time on certain productions, may have agreed that a 35mm print will be made of a film so that it may use it for theatrical showings. In this case the film stock should be of normal contrast and the aspect ratio of the print should be 1.85:1. Unless otherwise agreed in advance with S4C. S4C will require that an Interpos and an Interneg are struck from the edited neg and that unless otherwise agreed three copies of the final print will be delivered. They will have a combined optical sound track and will be suitable for projection at a theatre or cinema.

### **PROGRAMMES MADE FOR TV AND CINEMA**

It should be borne in mind that the optically large dynamic range of film, and the large audio dynamic range of cinema release productions often may not be ideal for transmission on TV.

Also it is possible that the S&P to 14:9 policy may not have been adhered to for artistic reasons, by special exemption, as it may have been deemed to be primarily a "Cinema Release" production. In such special cases, consideration must be given to optimising such commissions for transmission on TV at the Telecine Transfer stage.

This can be achieved by PAN and Scan, for the action and titles sequences, and by Audio processors to limit the Audio Dynamic range. In such special cases in order to avoid unnecessary re-transfers, liaison with S4C's Director of Engineering and Technology or Head of Technical operations should be sought before the Telecine transfer takes place.

## **SUBTITLES**

S4C has undertaken to subtitle a substantial number of programmes that are transmitted for linguistic understanding. To assist the development of this service, the following should be delivered with the programme tape if it is to be broadcast with closed captions (teletext page 888) and they are not already encoded on line 335:

1. Recorded on a professional machine, an S-VHS of the programme having LTC on track 1, a mix down of programme sound on track 2, normal programme sound on the Hi Fi tracks and also burnt-in timecode at the top of frame exactly matching the transmission tape timecode.
2. A copy of the script.

If there is a provision of open linguistic subtitles for all or even part of the programme, this should be made known to S4C's Director of Channel Management so that it is properly co-ordinated with the closed caption service.

Suppliers should also be aware that the use of the lower part of the picture frame for high volumes of graphic or caption content makes the programme unsuitable for subtitling.

If subtitles are incorporated in the VBI, they shall conform to CCIR Teletext System B and be inserted on TV line number 335.

## **LOGOS**

All S4C's commissioned programmes are now transmitted on our digital services, since the S4C logo is used in the top left hand corner of the screen on these services, this area must be free of captions, logos or any other graphic images that might conflict with the S4C logo. See Appendix 1.

## **TIMECODE**

LTC to be supplied on all master tapes and shall conform to the relevant 625 EBU specification. It must be continuous, coherent and not pass through zero at any point. If VITC is supplied, it must be identical to LTC and be on lines 19, 21,

332, 334. Timecode must have the correct phase relationship with the video signal.

## **AUDIO CONTENT**

The audio signal shall be free of noticeable or spurious signals such as hum, distortion or sibilance. It should not exhibit dynamic and frequency response artefacts as a result of the action of noise reduction or low bit rate coding systems.

Tonal balance shall be pleasing and neutral.

Audio should be in synchronisation with the video to a tolerance of  $\pm 1$  field.

Audio tracks must be suitable for reproduction on domestic television receivers. Sound that has been balanced at high levels is frequently found to have an unacceptably wide dynamic range for the home environment. The dynamic range of sound tracks should be limited so that it is suitable for the domestic environment and the loudness controlled so that viewers have no need to adjust volume during or between programmes, (see subsequent note on Levels in Relation to Other Channels). On stereo programmes, attention should be paid to the derived mono signal to ensure compatibility and freedom from phase cancellation effects. Stereo programmes must carry sound in A-B (Left-right) form. M-S is not acceptable.

## **AUDIO SIGNAL**

### **Stereo/Mono:**

Programmes shall be provided with stereo sound unless this is impractical.

Stereo signals shall be recorded:

Track 1 - Left Channel.

Track 2 - Right Channel.

Tracks 1 and 2 will be routed to the Nicam broadcast sound channels. The monophonic FM broadcast sound channel is derived by a linear addition,  $(A+B)/2$ , of the left and right channels.

Tracks 1 and track 2 shall be recorded in identical phase relationship throughout the programme including line up tone signals at the head.

Tracks 3 and 4 shall be replicas of tracks 1 and 2 unless specified otherwise by S4C.

Mono signals shall be recorded:

Track 1 - mono mix.

Track 2 - shall be identical to Track1.

(Known as DUAL CHANNEL MONO).

Tracks 1 and 2 will be routed to the Nicam broadcast sound channels. The monophonic FM broadcast sound channel is derived by a linear addition,  $(A+B)/2$ , of the left and right channels.

Tracks 1 and track 2 shall be recorded in identical phase relationship throughout the programme including line up tone signals at the head.

Tracks 3 and 4 shall be replicas of tracks 1 and 2 unless specified otherwise by S4C.

Documentation (see later) must unequivocally state whether the programme is stereo or dual channel mono.

Programmes delivered by line, as opposed to videotape, shall conform to the above channel configurations.

### **Dual Language:**

Programmes delivered with Dual Language sound shall conform to the above specifications, with the addition that:

Welsh programme sound will be on Tracks 1 and 2.

English programme sound will be on Tracks 3 and 4.

## Audio Description:

Programmes delivered with Audio Description shall conform to the above specifications, with the addition that:

Welsh programme sound will be on Tracks 1 and 2.

Audio description will be on Track 3.

Normal speech level (peaking PPM 5)

Pan and Fade control signal will be on Track 4.

Minus 12db wrt line up (peaking PPM 1)

## Levels:

The sound source must be controlled to ensure that the peak audio level does not exceed 0dBu 1kHz reference level by more than 8dB.

Levels shall be in accordance with those specified in the ITC/Ofcom Handbook Section 3 page B3, reproduced here for the avoidance of doubt.

<u>Material</u>	<u>Normal Peaks</u>	<u>Full</u>
<u>Range</u>		
Speech:		
Talks, News, Drama, Documentaries. Discussions, Panel Games, Quiz Shows, Announcements.	5	1-6
Music:		
Variety, Dance Music.	4½	2-6
Brass Bands, Military Bands.	4	2-5
Orchestral Concerts.		1-6
Light Music.	5½	2-6
'Pop' Music.	5	2-5
Programmes containing a high degree of compression.	4	2-4

Volume compression, if used, should be restricted to 6dB of compression and the onset of compression should not occur below PPM 4.

## Levels in Relation to Other Channels:

Note that if, for most of the programme, peaks are less than the full range allowable, then it will sound ineffectively quiet to viewers who are channel hopping or in relation to material before and after.

Conversely, peaks consistently at the maximum of the full range may sound irritatingly loud to viewers in relation to other channels and to other programme material on S4C.

Recent guidelines issued by The Committee of Advertising Practice for OFCOM Licensees state:

*“6.9 Sound levels in advertisements*

*Advertisements must not be excessively noisy or strident. Studio transmission power must not be increased from normal levels during advertising breaks*

*Note:*

*The peak level of sound at the studio output should not exceed +8dBm.*

*To ensure that the subjective volume is consistent with adjacent programming, whilst also preventing excessive loudness changes, highly compressed commercials should be limited to a Normal Peak of 4 and a Full Range of 2-4 (measured on a PPM Type IIa, specified in BS6840: Part 10, Programme Level Meters).*

*A fairly constant average level of sound energy should be maintained in transitions from programmes to advertising breaks and vice versa so that listeners do not need to adjust the volume. A perceived loudness meter may be useful where sound levels might cause problems.”*

**Emphasis:**

Audio emphasis should be **off** when Digital Betacam recordings are made.

**AUTOMATED REPLAY**

It is of paramount importance that alignment and level control is as stated in this document. S4C uses automated replay machines for the transmission of recorded programmes and it is seldom possible to manually adjust levels on a programme by programme basis.

**VTR ALIGNMENT TAPES- DIGITAL BETACAM**

Video - Sony ZR2-1P      Part no 8-960-073-61

Audio - Sony ZR5-1P      Part no 8-960-073-51

**Line up to be carried out in accordance with Sony Customer information Sheets**

**VTR-107, VTR-109, VTR-113.**

**Audio line up being set to -18dbfs (EBU standard, used by UK broadcasters).**

**The result of the above is that 0dbu recorded on your machine gives 0dbu when played back on our machines.**

**LINE-UP SIGNALS**

Tapes must start with line-up reference signals as follows:

**Stereo:**

<u>Time</u>	<u>Picture</u>	<u>Track 1</u>	<u>Track 2</u>
-90 secs.	100% colour bars.	Interrupted zero level tone.	Continuous zero level tone.
-30 secs.	Countdown identification clock to include word 'STEREO'.	Silence.	Silence.
-3 secs.	Black level.	Silence.	Silence.

The tone must be phase coherent on each track.

Interrupted tone is tone broken for approximately ½ second every 3 seconds.

**Mono:**

<u>Time</u>	<u>Picture</u>	<u>Track 1</u>	<u>Track 2</u>
-90 secs.	100% colour bars.	Continuous zero level tone.	Continuous zero level tone.



029 20 741209 (or MCR - PC's on 029 20 741230 at other times), to explain the circumstances. Where appropriate S4C will agree to amend the delivery time and arrangements.

S4C will transmit a stand by programme if communication has not been established and/or if the tape has not arrived at the time specified in the Commissioning Agreement.

In accordance with the Commissioning Agreement, S4C will expect delivery of two VHS copies of the programme (one with and one without timecode) to S4C's Library within two weeks of transmission or as noted in the Agreement.

### **Live Transmission or Programmes delivered 'down the line':**

General arrangements should be made known (and confirmed in writing) to the Head of Technical Operations at an early planning stage. These details should include the communication arrangements, the location and confirm the lines booking information.

S4C has a number of preferred satellites for receiving such events, these are:

**Intelsat 10-02**

**Eutelsat W2**

**Telecom 2D**

**Use of any other satellites must be by prior agreement with S4C, and a test may be requested to ascertain that adequate signal margins are obtainable.**

Please use the form provided in Appendix 2.

S4C expects that talkback will be provided by ISDN ccts, or equivalent quality.

For special live events the Producer and/or Technical Supervisor will be required to attend a technical production meeting at S4C to discuss details with the Engineering and Presentation departments and any other relevant party.

You are required to confirm any amendments to the original details, the timetable for the rehearsal/test process and confirm the contact name(s) and telephone numbers to S4C's Librarian (telephone number 029 20 741209) **at least 24 hours beforehand** (or by 16:30 on the Friday afternoon if the programme is scheduled for transmission over the week end). You will be asked to confirm an approximate running time for the programme. This information will be circulated

to the Head of Technical Operations, the Presentation Department and MCR (PC's and Engineering).

The Producer is expected to contact S4C's Presentation Department at the latest 3 hours prior to transmission, to establish a line of communication and to discuss any last minute changes (Presentation Department 029 20 741265 within office working hours or 029 20 741230 at other times). Similarly contact should be made between the on site programme director and S4C MCR (Engineering).

S4C will transmit a stand by programme if the Producer does not adhere to the above guidelines.

In accordance with the Commissioning Agreement, S4C expects delivery of a Digital Betacam copy of those programmes transmitted down the line, together with two VHS copies (one with and one without timecode) to S4C's library within a fortnight of transmission or as stated in the Agreement.

The tape delivery requirements (if at all) for the programmes will be specified in the Commissioning Agreement. This will refer to a Digital Betacam ROT (Record off Transmission) copy and until May 2007 2 x VHS copies with Hi Fi sound or 2 x DVD (-R) of the programme. After May 2007 we will only accept DVD's.

## **CONTACTS**

A contact card is available to remind Producers of S4C's contact telephone numbers.

Cards can be obtained from Carly 20741265 or Laurie 20741479.

### **Office working hours: 09:00---17:15**

Librarian S4C	029 20 741209	
Presentation department	029 20 741265	Fax 029 20 741259

### **Outside office working hours:**

MCR (P.C's)	029 20 741230	Fax
MCR (Engineering)	029 20 741240	029 20 741375

### **Line-up / Signal Stability:**

The on-site facility must be able to originate audio and video line-up signals. These should consist of 100% colour bars (75% if the vision signal is to be linked by satellite) together with zero level reference tone. For stereo origination, the left-hand channel tone should be intermittent. Video pulse and bar, preferably as an insertion test signal, will also be required to equalise the circuit. Line-up signals must be available at least 30 minutes before the start of the programme and an engineer designated to liaise with S4C MCR. The video signal must be stable and continuous throughout the broadcast.

## **STANDARDS CONVERSION**

The 525 line NTSC signal has inherently less resolution than the corresponding 625-line PAL signal; therefore the use of pictures originating on the 525-line format is strongly discouraged.

If cut film of the required material exists, direct telecine transfer to the 625-line format will always obtain the best results.

When pictures exist only on 525-line videotape, standards conversion using broadcast quality; current generation equipment is mandatory. This means using advanced motion prediction and noise reduction or image enhancing techniques. Conventional conversions using interpolation techniques are not acceptable.

Proposals for programmes to incorporate more than a very small proportion of pictures originating in the 525-line format must be discussed with the Director of Engineering and Technology.

## **GUIDANCE ON THE USE OF NON-BROADCAST FORMATS.**

Occasions will arise when it will be necessary to use non-broadcast VTR formats with their reduced technical performance to provide a service to the television audience. These will usually involve the provision of local programme input or documentary items reporting events that are not planned and therefore not covered by a full ENG crew. An example of such events is the reporting of a fire or accident etc. covered by a 'stringer', newspaper journalist, the Police or Fire Brigade.

The duration of inserts to programmes obtained using these formats should not normally be more than about 3% of the total programme run time.

Cameras will normally be of a type capable of meeting the required ENG subjective performance of Grade 4 or better. This presently rules out the use of single sensor cameras although it is appreciated that such cameras may be used on rare occasions for important investigative reporting where they would bear an 'amateur video' caption.

It is essential that impairments introduced by the recording/playback process are kept to a minimum, which means that, in general, any subsequent editing and dubbing should be carried out using equipment that meets the full broadcast performance specification.

S4C requires any proposed use of non-broadcast format (NBF) equipment to be discussed first with the Director of Engineering and Technology. The following is intended to provide some background on where the use of NBF material is likely to be acceptable and some advice on how to achieve the best quality in the circumstances.

Firstly, one should say that S4C's approach is not one of engineering purity. The principle objective is that the viewer should be satisfied with the quality in the overall context of the programme. This is not 'carte blanche' however, viewers do complain about quality matters and there is a difference between NBF's and broadcast formats. Use of NBF's should not be proposed simply to save money.

The differences can be assessed in terms of picture quality, of sound quality and in terms of operational facilities. Clearly they are interactive.

Picture quality in good lighting conditions can be very acceptable. Technically, the pictures will inherently lack definition, but on a sunny day the results will be perfectly satisfactory to the majority of viewers. When conditions are adverse, the quality will degrade much more quickly than the professional counterpart.

Sound quality is problematic. Recorded tracks on NBF's are sometimes adequate for actuality effects but may be found rather 'woolly' for important dialogue etc. The problem is partly the technical performance of the track but more importantly the proper control of sound recording with external microphones, mixer etc. are necessary to achieve an acceptable result, as is so with professional equipment.

Operational factors. The point is made that a professional crew on a shoot does contribute a great deal to the final picture quality. Factors such as use of tripods, lighting, camera skills and so on contribute as much as the recording format itself. Clearly, there would be little saving overall in employing a professional crew with a sub standard camcorder.

The Director of Engineering and Technology is required to make judgements on individual cases and does so balancing the production advantage with the technical quality achieved and the duration of the material, in assessing the likely viewer reaction. It is important that the viewer can see an obvious reason for sub-standard pictures. For example, some reduction in quality is readily understood when an old feature or when actuality news footage is shown. Likewise there are unlikely to be any objections when an NBF is used in a situation when it is obvious that the camera is in amateur hands, provided reasonable quality is achieved.

However, if poor quality is seen on general entertainment programmes or if it goes on for a long time, viewers can reach for their remote controls; the ease of 'channel hopping' must be kept in mind in these debates.

Where an NBF is approved for source recording, it is strongly recommended that it is dubbed immediately to a broadcast format for post production or edited from a suitable player directly to a broadcast format with no further generations on the NBF; quality losses and difficulties are compounded when editing on NBF's. Where possible, users should receive some training in the use of the camera (for example, setting colour balance, how to avoid unsteadiness, best use of available light etc.). A test or trial run may also help to avoid problems later.

## **GUIDANCE ON THE USE OF SYSTEMS USING VIDEO COMPRESSION**

The use of compression techniques for non-linear off-line work is now well established. As development continues, the available image quality rises and non-linear editing devices are offered as applicable to on-line work.

Broadcasters, including S4C, have two concerns. First the claim that a given device offers 'broadcast quality' may not be supportable by independent

assessment, such as by evaluation using OFCOM technical codes of practice. Second, the effect due to cascading different compression algorithms.

In a production environment, a programme or its inserts will be routed from one signal processing system to another, e.g. from a non-linear editor to a videotape recorder. Much more complex chains are easily achieved in practice with each process using a compression algorithm developed exclusively for its specific task. In addition, the signal will pass along studio-to-studio, satellite, or studio-to-transmitter feeds that may also use compression, although typically at a relatively high data rate (low compression). Work is going on to evaluate the effect of cascading independent compression techniques.

Caution is needed. Some commentators are of the opinion that there is no need for compression to be used at all in the production environment because here bandwidth is readily available and that it should be restricted to applications, such as studio or transmitter feeds and over air transmission, where it is not. They point out that non-linear editing systems are available which do not use video compression. Others argue that the flexibility of systems using compression is too valuable to be ignored and that image quality is adequate for some broadcast applications. It is widely accepted in news programming, for example.

Dedicated test signals exist for assessing some aspects of the performance of video equipment and systems but there is an increasing reliance being placed on the use of real programme material in this area. This is because many processes such as bit rate reduction (compression), format conversion and movement portrayal etc. employ coding algorithms whose outputs are determined by the content of the signals present at the input, the mathematics of the algorithm itself and the transport rate. The majority of scenes are likely to pass through such systems without any noticeable impairment unless there is a fault condition but there will be a small percentage of scenes that cause significant impairments. This percentage is likely to increase when several different types of system are cascaded together.

Test sequences of real programme material should be used to assess the performance of such systems and these should contain "normal" programme material and some "critical" material that will stress the system and give an indication of a quality threshold. Suitable sequences can be obtained from the EBU (mobile and calendar, Renata, flower garden and Diva with noise etc.) and locally made sequences including material with areas of saturated colour, fine

detail, movement, scrolling captions etc. can be added to a test tape. This should be originated in a non-compressed, digital component format.

S4C requires that the supplied signal meets the quality requirements stated elsewhere in this document irrespective of whether compression is used or not.

Furthermore for certain high value programmes, classified as category 'A', S4C reserves the right to request that any post production on non-linear editing equipment (NLE) using compression, is first discussed with the Director of Engineering and Technology or the Head of Technical Operations. Normally S4C requires that such high value commissions are post produced on a full broadcast standard format, and delivered on Digital Betacam for transmission. This does not preclude the use of NLE's for off line purposes.

## **FLASHING IMAGES OR REPETITIVE PATTERNS**

The Broadcasting Code published by Ofcom in 2005 places a duty of care upon broadcasters and mentions Photosensitive Epilepsy in section 2.13;

*“2.13 Television broadcasters must take precautions to maintain a low level of risk to viewers who have photosensitive epilepsy. Where it is not reasonably practicable to follow the Ofcom guidance (see the Ofcom website), and where broadcasters can demonstrate that the broadcasting of flashing lights and/or patterns is editorially justified, viewers should be given an adequate verbal and also, if appropriate, text warning at the start of the programme or programme item. “*

The full code can be found at;

<http://www.ofcom.org.uk/tv/ifi/codes/bcode/harmoffence/>

Ofcom guidance on flashing images and repetitive patterns is as follows;

1. Flashing lights and certain types of regular visual patterns can cause problems for some viewers who have photosensitive epilepsy. People below the age of 20 Years are the most susceptible group and many are unaware of their susceptibility.

Care must be taken to minimise these risks in all programmes, but especially where young people are likely to be watching in significant numbers. This might mean cutting or amending certain scenes or sequences or rejecting entirely some material.

At times difficulties in minimising the effects may be encountered, for example with some types of live coverage, such as a news report. Where

there is likely to be significant risk, viewers should be given an appropriate warning at the start of the programme item.

2. Television is by nature a flickering medium (because of the 50Hz refresh rate of typical TV receivers and the 25Hz effects of interlaced scanning) and it is therefore not possible to completely eliminate the risk of television causing convulsions in those viewers with photosensitive epilepsy. There are certain types of visual stimuli that are most likely to cause these problems, however, and these should, therefore, be avoided in television programmes or advertisements where possible.
3. **Flashing and flickering images** in colour or black and white, which result in visible screen brightness changes of more than 10% screen area at a rate exceeding 3 flashes per second, should be avoided.
  - 3.1 Moderate repetitive changes in screen brightness exceeding 10% screen area are acceptable, provided the difference in brightness over any two consecutive frames in a sequence does not exceed 10%. This is measured as the difference in brightness between the lighter and corresponding darker image area expressed as a percentage of the brighter image. Brightness changes greater than 10% will produce a visible flash and this therefore represents a risk. In this case only one flash will be allowed in any nine-frame period.
  - 3.2 Brightness level changes exceeding 10% are also acceptable in small areas. Up to 10% of the screen, either a single area or a sum of smaller parts, may change at any rate or brightness level.
  - 3.3 Flashes involving highly saturated red are particularly dangerous and should be avoided.
4. **Rapidly changing image sequences** are provocative when they result in a visible brightness change over more than 10% of the screen area, at a greater rate than 3 changes per second. An image, which changes every 9 frames or more, irrespective of its brightness or screen area, will comply with this guideline.

5. **Regular patterns**, which cover more than 10% of the screen area, should be avoided. A single pattern cycle may consist of distinct vertical, horizontal, diagonal, circular, radial line or bar segments followed by a segment of different brightness. Pattern cycles, which are repeated, can form grid patterns.
6. A pattern is considered provocative if it produces the equivalent of 10 to 40 cycles across the screen and the difference in screen brightness between any two adjacent segments exceeds 10%.
7. **Moving patterns**, which flow smoothly across, into or out of the screen in one direction, are not considered hazardous. However, a moving pattern, which changes direction, oscillates, flashes or reverses in contrast is particularly hazardous. Pattern contrast reversals using fully saturated red are not allowed.
8. **Computer generated images** which are highly detailed can cause a high degree of inter-line flicker in the picture at a rate of 25 times per second and should be avoided.

Screen brightness refers to luminance intensity. This can be measured directly on a monitor screen using a spot photometer suitable for T.V display measurements. Video waveform luminance is not a direct measure of display screen brightness.

If in doubt please contact S4C Head of technical Operations; 02920 741217  
[andy.palmer@s4c.co.uk](mailto:andy.palmer@s4c.co.uk)

## **SURROUND SOUND**

Care should be taken to ensure that the final audio mix gives satisfactory results on monophonic receivers and NICAM receivers. If the audio is encoded with surround effects, this should not produce an excessive dynamic range on any channel when decoded.

Since surround encoded material can be transparently carried within a stereo signal it is important to be able to monitor for compliance as well as decoded levels.

If it is necessary to limit the dynamic range of programme material by the means of an audio compressor, great care must be taken.

When used with stereo material, a dual channel compressor must be “ganged” so that any compression applied to either channel, is applied to both channels.

For surround encoded material, if compression is applied on a two-channel compressor, ideally, each channel must act in isolation. To reduce the dynamic range of surround encoded material it is preferable to decode to individual channels, compress and then re-encode to obtain satisfactory results.

## **WIDESCREEN PROGRAMMES**

Programmes intended for widescreen transmission, should be handled using component video not composite, and be delivered on Digital Betacam, with the image recorded Full Height Anamorphic and in the aspect ratio of 16:9. This means that if the tape is viewed on a 4:3 monitor the images appear tall and elongated, if the tape is viewed on a 16:9 monitor, the images will appear the correct shape.

If the programme has been shot on a 16:9 video camera and recorded to tape, then this will happen of its own accord. However, if the programme has been shot on film, more care must be taken.

In the case of Super 16 film the aspect ratio of the image on the film is actually 15:9, it is essential that when the film is transferred to tape that the Telecine is set up to produce a 16:9 image on the tape.

This fact has a throw back to the way in which the programme is shot, in order for the Telecine to produce a 16:9 image from a 15:9 image, a small amount of vertical cropping will take place, this must be taken into account at the shooting stage, and the shots framed accordingly.

If the programme was shot on 35mm film then the choice of aspect ratio for the shoot must be decided before hand bearing in mind that it will have to be transferred to video tape in the ratio 16:9.

S4C has two transmission environments, Analogue and Digital.

For our Digital services widescreen programmes are transmitted as widescreen, viewers with widescreen sets will see the full picture; those with normal 4:3 sets

will see a centre cut out of the widescreen picture. This is an effect delivered by the set top box that the viewer is using to receive their digital signals.

**Therefore when shooting and captioning widescreen programmes for Digital transmission, it must be borne in mind that some viewers will only see the centre portion of the picture.**

On our analogue service we transmit widescreen programmes in the form of 14:9 letterbox. This results in very thin black bands at top and bottom of picture and also the loss of a small amount of the edges of the frame, approx. 6%. **Again when shooting and captioning widescreen programmes this must be taken into account. This should make clear the reason for the requirement when asked for 'shoot and protect 14:9' on 16:9 commissions.**

Please see attached 'Safe area' diagram.

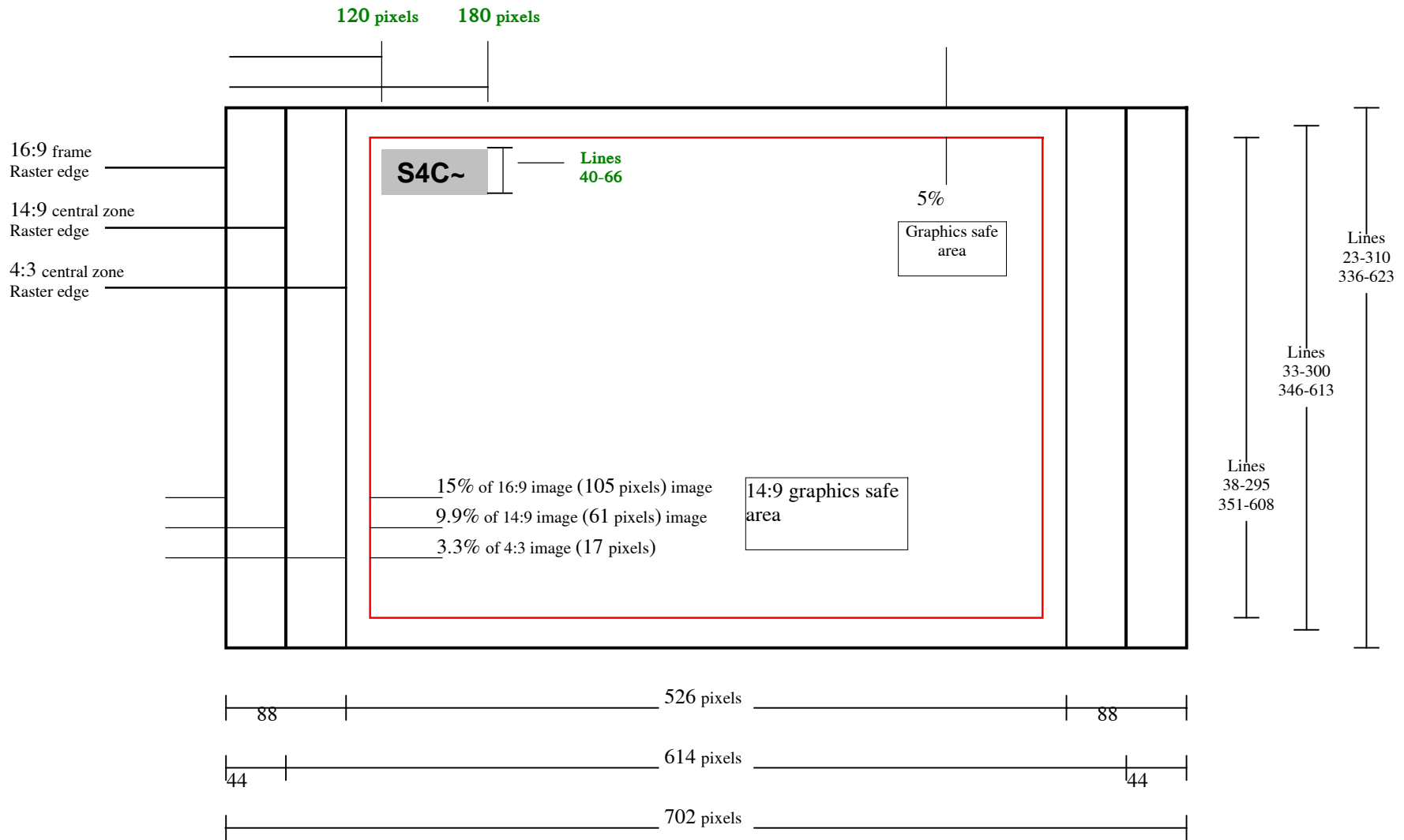
Finally it should be remembered that widescreen programmes should be delivered to S4C in their 'Full Height Anamorphic' form and that programmes delivered in **any form** of Letterbox format are **not acceptable to S4C.**

## **HIGH DEFINITION.**

For information on High Definition programmes please see the guidance document on the S4C website;

[http://www.s4c.co.uk/producers/downloads/guidelines/e\\_highdefinition.doc](http://www.s4c.co.uk/producers/downloads/guidelines/e_highdefinition.doc)

## **Appendix 1**



**16:9 Shoot to Protect 14:9, defining Graphics Safe Area**

S4C – 2006

S4C – 2005

## **Appendix 2**

# S4C Technical information requirements; Outside Broadcasts

Version 2 31/08/06

General arrangements should be made known (and confirmed in writing) to the Head of Technical Operations at an early planning stage.

[Andy.Palmer@s4c.co.uk](mailto:Andy.Palmer@s4c.co.uk)

02920741217 / 07778306139

These details should include the communication arrangements, the location and confirm the lines booking information. It should also be made clear which route is to be the main and which is to be the reserve circuit. . S4C expects that talkback will be provided by ISDN ccts, or equivalent quality.

For special live events the Producer and/or Technical Supervisor will be required to attend a technical production meeting at S4C to discuss details with the Engineering and Presentation departments and any other relevant party.

Once the relevant sections of this form have been completed it should be e-mailed to the following recipients;

[Andy.palmer@s4c.co.uk](mailto:Andy.palmer@s4c.co.uk)

[MCRsupervisors@s4c.co.uk](mailto:MCRsupervisors@s4c.co.uk)

<b><u>Event:</u></b>	
<b><u>Date / Time:</u></b>	
<b><u>Location:</u></b>	
<b><u>Programme:</u></b>	
<b><u>Schedule:</u></b>	
<b><u>Vision ccts:</u></b>	
<b><u>Sound ccts:</u></b>	

<b><u>Other ccts:</u></b>	
<b>Delivery method:</b>	
<b>Routing:</b>	
Main: Cct	
<b><u>Reserve Cct:</u></b>	
<b>Satellite details:</b>	<p><b>S4C's preferred satellites are: Intelsat 10-02 Eutelsat W2 Telecom 2D</b></p> <p>Use of any other satellites must be by prior agreement with S4C, and a test may be requested to ascertain that adequate signal margins are obtainable.</p>
Bird:	
Position:	
Azimuth:	
Elevation:	
Booking No:	
Transponder:	
Uplink Freq and Pol :	
Downlink Freq and Pol:	
S.R.:	
FEC:	
Comms:	
Start / End time:	
<b>Contact numbers:</b>	
Engineering manager:	

Comms manager & Uplink.	
Production Gallery :	
Others: :	
<b>Contact details for information provider:</b>	
<b>Notes:</b>	